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# Complete Embolization of a Left Atrial Myxoma

Resulting in Acute Lower Extremity Ischemia

*Atrial myxoma is the most common benign tumor of the heart. Patients who have atrial myxomas usually present with cardiac obstruction, arrhythmias, or peripheral embolization. A tumor originating in the left atrium most often embolizes to the cerebrovascular system. Complete myxoma embolization to the peripheral vessels is rare and usually occurs with tragic consequences. We present an unusual case of acute lower extremity ischemia due to the complete embolization of a left atrial myxoma. (Tex Heart Inst J 2005;32:238-40)*

**L**eft atrial myxomas are an uncommon cause of acute peripheral artery ischemia. These benign intracardiac tumors can give rise to emboli large enough to cause vascular occlusion. Peripheral embolization generally results from tumor fragmentation, or, less often, from complete tumor detachment, causing syncope, dyspnea, neurologic symptoms, or ischemic limb pain.<sup>1-5</sup> We present an unusual case of complete embolization of a left atrial myxoma resulting in acute peripheral artery occlusion and sudden lower extremity ischemia.

## Case Report

In May 2003, a 53-year-old woman presented to an outlying emergency room with chief symptoms of acute severe left leg pain, left leg paralysis, and bladder incontinence while exercising on a treadmill. About 2 hours after the event, she was transferred to our facility, where she was found to have a cold, pale, painful left leg. She was otherwise healthy, without previous cardiac or vascular history. Results of her cardiopulmonary exam were normal, with no murmurs or audible extra heart sounds, and an electrocardiogram was normal as well. A weakly palpable left femoral artery pulse was present. The patient had no palpable left pedal pulses. Her left foot was pale, cold, and insensate. She was unable to move the foot but could flex her knee, with difficulty because of the pain. The right leg was normal, with palpable femoral, dorsalis pedis, and posterior tibial pulses. Neurologic examination of the right leg also yielded normal results.

The patient was diagnosed with acute arterial ischemia with neurologic injury and was taken emergently to the operating room. To avoid further neurologic injury and delay of treatment, preprocedural imaging was not performed. An embolectomy was performed through a left femoral incision. A combination of fresh thrombus and organized gelatinous material was removed with Fogarty catheters from the left popliteal, superficial femoral, and iliac arteries. The embolus consisted of multiple large, rubbery, tan masses with adherent gelatinous material and fresh clot (Fig. 1). After the embolectomy, an intraoperative digital subtraction angiogram was performed on the left lower extremity. The angiogram revealed good runoff and no additional occlusive material in the left iliac and left lower extremity arteries. A formal arteriogram of the aorta was not performed at this time. The artery was closed, and a 4-compartment fasciotomy was performed on the left lower leg. The leg showed evidence of reperfusion ischemia. In the recovery room, the patient had palpable pedal pulses in both legs. The heparin anticoagulation that had been started in the emergency department was continued in the recovery room.

Eight hours later, the patient began to experience acute right leg pain. On examination, the right femoral artery pulse was markedly diminished, the right pedal pulses were not palpable, and the foot was cool. The patient was taken to the catheterization laboratory where thoracic and abdominal angiography with runoff

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was performed. Acute right common iliac artery occlusion was seen. The patient was immediately taken to the operating suite and a right iliac artery embolectomy was performed with a Fogarty embolectomy catheter; another large embolic mass was recovered. Fresh section histology confirmed the diagnosis of atrial myxoma (Fig. 2). Postprocedural angiography revealed the return of flow to the right lower extremity, and there were palpable distal pulses. Formal aortic arteriography was performed in the endovascular suites after the procedure. No other abnormalities were detected.

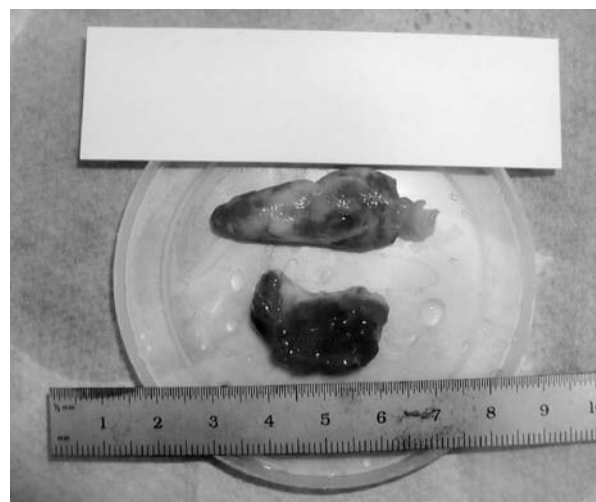
Transesophageal echocardiography was performed after the procedure. No tumor was detected in the left atrium, but an irregularity on the intra-atrial septum was found and was thought to be a myxoma attachment site (Fig. 3). A computed tomographic (CT) scan of the abdomen revealed no intra-abdominal disease process. Testing for hypercoagulable disorders did not detect any clotting abnormalities. Subsequent magnetic resonance imaging (MRI) of the heart also identified the thickened atrial wall seen on the transesophageal echocardiogram. This suggested a previous myxoma implant, but no pedicle or residual mass was seen.

The patient's fasciotomies were closed on the 6th day after surgery, and she was discharged from the hospital on warfarin therapy. She initially had a slight left footdrop. At the 2-year follow-up, the patient had completely recovered and was able to walk normally. Subsequent follow-up examination has not revealed a recurrence of the myxoma.

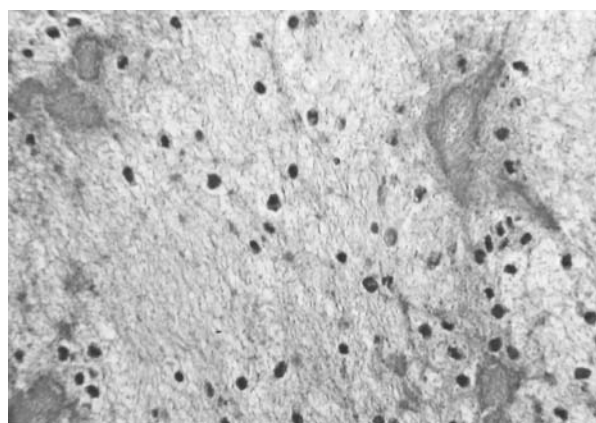
## Discussion

Atrial myxomas have been described as a proliferation of primitive mesenchymal cells that normally differentiate into endothelial and smooth muscle cells and fibroblasts.<sup>6</sup> Atrial myxomas represent roughly 50% of all benign cardiac tumors.<sup>7</sup> The tumors occur slightly more often in women, and presentation is usually in patients from 30 to 60 years of age. Myxomas are present in the left atrium approximately 75% of the time and are generally attached to the left atrial wall by a stalk of fibroelastic tissue; they are rarely found in the ventricles.<sup>8,9</sup>

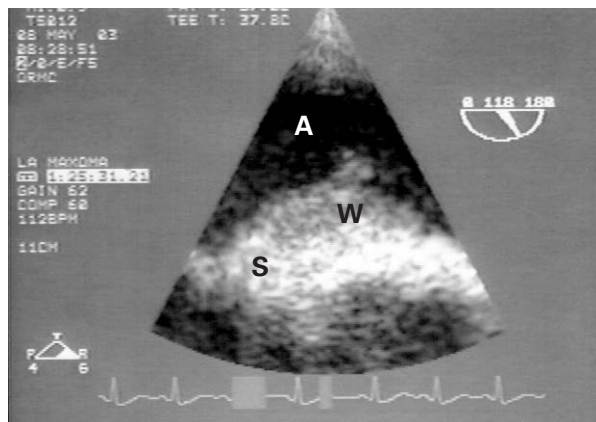
Clinical manifestations of atrial myxomas result from cardiac obstruction, arrhythmias, or peripheral embolization.<sup>1</sup> Embolization resulting from fragmentation or complete tumor detachment occurs in up to 30% of cases.<sup>10</sup> Most of these tumors embolize to the central nervous system, resulting in cerebrovascular accidents. Embolization to the lungs, coronary arteries, kidneys, spleen, intestines, and lower extremities also occurs.<sup>11</sup> Previous case reports have described embolization to the abdominal aorta resulting in aortoili-



**Fig. 1** Macroscopic view of gelatinous tan myxoid material and thrombus recovered after iliac artery embolectomy.



**Fig. 2** Microscopic view of material removed from the iliac artery. Prominent spindle/ovoid/stellate cells can be seen with indistinct cell borders in a background of blue-gray mucopolysaccharide ground substance. Hemosiderin pigments are present. No anaplasia or mitosis is seen (H & E, orig. x400).



**Fig. 3** Transesophageal echocardiography of the heart shows the irregular atrial wall.

A = left atrium; S = atrial septum; W = atrial wall irregularity

ac occlusion and saddle embolus, which in turn caused spinal cord ischemia, peripheral nerve injury, aneurysmal dilatation, and secondary infection.<sup>4,12-16</sup> Complete embolization of atrial myxoma is rare and usually has tragic consequences.<sup>4,5,16-20</sup>

The diagnostic and surveillance method of choice is echocardiography; MRI is used in specific circumstances to provide additional information about the extent of tumor involvement. Peripheral and coronary angiography can provide additional information about the complications associated with myxomatous emboli.<sup>9</sup>

Typical treatment of cardiac myxomas is surgical removal, with the patient under cardiopulmonary bypass; the friable tumor mass is carefully excised from the atrial wall. A portion of healthy tissue is removed with the specimen, and the generation of embolic fragments is avoided to prevent recurrence. Follow-up echocardiography is also recommended after excision. Recurrence of the tumor has been reported in up to 17% of cases and can occur at the original site of implantation, at other foci, or as a result of direct embolization. Malignant transformation has been described.<sup>12</sup>

The patient presented here had no previous medical conditions, constitutional symptoms, or obstructive symptoms before her embolic event, which should serve as a reminder that the diagnosis of embolic myxoma should be suspected in younger, previously healthy patients presenting with acute arterial ischemia. The diagnosis was made clinically and histologically when the myxomatous material was recovered at the time of the operation. The absence of residual tumor in the heart, confirmed by transesophageal echocardiography and MRI, suggests complete embolization. Our patient's dramatic presentation with a single acute event, however, prompted immediate treatment and resulted in functional recovery with minimal complications.

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